

We claim:

1. An expression-varying device for a toy comprising:

a first facial element; and

a drive coupled to said facial element, said drive including a drive shaft, a disk mounted on said drive shaft, and an arm member engaged with said disk and coupled to said facial element, rotation of said drive shaft rotating said disk, which in turn moves said arm member, which imparts movement in two substantially perpendicular directions to said first facial element.

2. The expression-varying device of claim 1, wherein said first facial element is an eyeball body.

3. The expression-varying device of claim 1, wherein said arm member includes a pin, said disk includes a groove formed therein, and said pin engages said groove.

4. The expression-varying device of claim 1, wherein said disk includes a center and a groove extending about said center, the distance between said groove and said center varying along said groove, and said groove varying in depth along said groove.

5. The expression-varying device of claim 3, further comprising:

a frame supporting said drive; and

a spring coupled to said frame and said arm member to bias said pin into engagement with said groove.

6. The expression-varying device of claim 1, further comprising:
a frame supporting said drive; and
a plate coupled to said frame, wherein said plate defines an opening into which a portion of said first facial element extends.

7. The expression-varying device of claim 1, further comprising:
a frame;
a plate coupled to said frame;
a first coupling shaft pivotally mounted with respect to said plate, said first coupling shaft including a tip end and a rear end;
a second facial element coupled to said tip end of said first coupling shaft; and
a first crank coupled to said rear end of said first coupling shaft, said first crank engaging said drive, wherein upon rotation of said drive shaft, said first crank moves and said first coupling shaft pivots, thereby imparting movement to said second facial element.

8. The expression-varying device of claim 7, wherein said drive includes a first cam mounted on said drive shaft, said first cam having a wave-form surface with projections and indentations formed on a circumferential edge of said first cam, said first crank having a first engaging shaft formed thereon, and said first engaging shaft engages said wave-form surface as said first cam rotates.

9. The expression-varying device of claim 8, further comprising:

a second coupling shaft pivotally mounted with respect to said plate, said second coupling shaft including a tip end and a rear end;

a third facial element coupled to said tip end of said second coupling shaft; and

a second crank coupled to said rear end of said second coupling shaft, said second crank engaging a second cam mounted on said drive shaft, wherein upon rotation of said drive shaft, said second crank moves and said second coupling shaft pivots, thereby imparting movement to said third facial element.

10. The expression-varying device of claim 9, further comprising:

a spring connected between said first crank and said second crank, wherein said first crank includes a first hook, said second crank includes a second hook, said spring being connected to said first and second hooks, said second crank having a second engaging shaft formed thereon, and said spring biasing said first engaging shaft and said second engaging shaft into engagement with said first cam and said second cam, respectively.

11. The expression-varying device of claim 1, further comprising:

a detection device which detects the rotational position of said disk.

12. The expression-varying device of claim 11, wherein said drive is supported by a frame, and said detection device includes an indicating part formed on the circumferential surface of said disk and a switch mounted on said frame which opens and closes relative to successive indicating parts as said disk rotates.

13. The expression-varying device of claim 7, wherein said first facial element is an eyeball body, said second facial element is an eyebrow body, and said eyeball body and said eyebrow body are moved simultaneously.

14. A method of producing multiple expressions in a toy comprising:
moving a first facial element in two substantially perpendicular directions; and
moving a second facial element substantially simultaneously with said moving said first facial element.

15. The method of claim 14, further comprising:
moving said first facial element to a first position;
moving said second facial element to a second position, the first and second facial elements producing a first expression when in said first and second positions, respectively.

16. The method of claim 15, further comprising:
moving said first facial element to a third position; and
moving said second facial element to a fourth position, said first and second facial elements producing a second expression when in said third and fourth positions, respectively, said second expression being different from said first expression..

17. The method of claim 16, wherein said moving a first facial element includes moving said first facial element with a drive including a drive shaft and a disk mounted to said drive shaft, and said moving said first facial element to a first position and said moving said second facial element to a second position include rotating said disk to a first rotational position.

18. The method of claim 17, wherein said moving said facial element to a third position and said moving said second facial element to a fourth position include rotating said disk to a second rotational position, said second rotational position being different from said first rotational position.

19. The method of claim 18, further comprising:

determining whether said disk is in said second rotational position.

20. The method of claim 18, further comprising:

detecting the rotational position of said disk; and

comparing said detected rotational position of said disk with a desired rotational position.

21. The method of claim 14, wherein said first facial element is an eyeball body, said second facial element is an eyebrow body, and said moving a first facial element and said moving a second facial element are coordinated to produce at least two of the following expressions: sleeping, sadness, joy, anger, determination, and inquisitiveness.

22. The method of claim 14, wherein said moving a first facial element includes moving said first facial element in an upward and downward motion and moving said first facial element in a side to side motion.

23. An expression-varying device for a toy comprising:

a supporting member pivotally supporting two eyeball bodies for rotation about two substantially perpendicular axes;

a connecting member connecting said two eyeball bodies, said connecting member connecting said eyeball bodies so that said eyeball bodies can pivot simultaneously; and

a drive connected to said connecting member and adapted to cause said two eyeball bodies to move in two substantially perpendicular directions to produce various facial expressions for the toy.

24. The device of claim 23, further comprising:

coupling shafts supported by said supporting member, said coupling shafts operably coupled to said drive and mounted for rotation relative to said drive; and

eyebrow bodies coupled to each of said coupling shafts and rotated upon the rotation of said coupling shafts.

25. The device of claim 24, wherein said eyeball bodies and said eyebrow bodies move simultaneously.